element. the front and back surfaces of said element must include an angle at least equal to the critical angle for said medium. The resulting oblique angles of viewing may cause a foreshortening of the print image which ranges from .67 for the lightest crown glass to .85 for the heaviest flint. Hence, in order to obtain minimum foreshortening, it is preferred to use a glass having as high a refractive index as possible.

In FIGURE 1 an optical element or a glass member 21 in the form of a truncated prism is utilized to provide a totally reflecting surface 27 against which a body part such as the finger 22 may be pressed. A virtual image of the ridge pattern of the finger is formed by means of a beam of light 28 generated by a flash or flood light source 23. The light beam 28 is passed through a fine grained light diffuser 24 to provide the background for the virtual image of the ridge pattern 29 which is seen by a camera 25 and may be recorded on a photochemical, xerographic, or photoelectric image-forming medium 26.

In FIGURE 2, the ridge pattern and the coupling medium is shown in more detail. The ridges 35 with a thin film of coupling medium 31 thereon totally frustrate the reflection of some light rays 33, thus generating the dark ridge pattern. Other light rays 32 impinge at the spaces between ridges and are totally internally reflected by the surface 34 of the optical element or transparent medium 36.

An alternate embodiment of the invention is shown in FIGURE 3 in which the light source 43 illuminates one portion of the subject's body such as the face 47 via the light path 42 and another portion such as the skin ridge pattern 45 of a finger 48 by means of the diffuser 53 via the light path 41. The camera 51 records both the facial features 47 of the subject via the light path 49 and the virtual image of the side reversed ridge pattern via the light path 50.

The skin ridge pattern of the body part or finger 48 is formed on the totally reflecting surface 45 of the optical element or prism 44. The virtual image of this pattern is internally reflected by the second surface 46 of the prism 44 reversing the ridge image into a virtual print image. The included apex angle α of the prism should be 90 degrees to permit the whole image-forming area 45 to be reflected by surface 46 and eliminate unnecessary refraction of the image during the passage from the dense transparent medium prism 44 to air. For best performance surface 46 should be silvered. The lens systems schematically illustrated by 54 and 55 can be introduced into the two image light paths 49 and 50 to make the size of the feature image 47 similar to that of the print image formed at 45. A baffle 52 is provided to screen the exit side 56 of the prism 44 from the light source 43 thus increasing the contrast of the image by preventing light from illuminating the image forming area 45 through reverse reflection.

Another embodiment of this invention is shown in FIGURE 4. Here the light source 60 illuminates the facial features 66 of the subject via the light path 61 while simultaneously illuminating the totally reflecting surface 62 via the diffuser 63 through light path 64. The skin ridge pattern of the bodily part 76 is formed at 62. The transparent medium of high refractive index in which total reflection occurs is in the form of a prism 65 having side angle β slightly larger than the critical angle of the high refractive medium from which it is made to permit operation as near as possible to normal incidence in order to obtain minimal foreshortening and distortion of the ridge pattern image formed on the totally reflecting surface 62. The image recording device 67 records both the facial features 66 via the light path 68 and the ridge pattern image formed at 62 via the light path 69–70–71. Along this latter path the ridge pattern image is first side reversed at the front surface mirror 72 and transmitted via the optical fiber

bundle 73 consisting of a large number of microscopically thin optically transparent fibers which dissect and transmit the image formed at 62 along their length, each fiber conserving its fractional part of the image due to total internal reflection. The fiber bundle 73 serves to maintain the size of the ridge pattern image and restore its proportions by elongating the foreshortening at its angular terminus 74. Fiber bundle 73 could also be used to quantize the image of the ridge pattern for subsequent data processing and reduction. The baffle 75 is provided to shield the exit face of the prism from the light source 60.

There thus has been disclosed an apparatus for recording the signalment of an individual which is simple but at the same time very reliable and requiries no special skills in its operation, and is therefore more economical than techniques or apparatus heretofore known in the art.

What is claimed is:

1. Signalment recording apparatus comprising, in combination, light image sensitive recording means for recording the image of the facial features of a subject and an image of the skin ridge pattern of a bodily part of said subject, a dense medium optical element having a totally internally reflecting surface adapted to have a skin ridge pattern formed thereon by contact therewith of said subject's skin ridges from the side of an adjacent rare medium thereby causing frustration of total reflection at the points of said contact, means for illuminating said facial features and said skin ridge pattern, first optical means between said totally internally reflecting surface and said recording means for side-reversing said skin ridge pattern image, and second optical means disposed between said first optical means and said recording means for adjusting the relative sizes of said facial and said skin ridge pattern images relative to each other.

2. An apparatus according to claim 1 in which said optical adjustment means consists of a lens system disposed in the ridge pattern image light path.

3. An apparatus according to claim 1 in which said optical adjustment means consists of a lens system disposed in the facial feature image light path.

4. Signalment recording apparatus comprising, in combination, light image sensitive recording means for recording the image of the facial features of a subject and an image of the skin ridge pattern of a bodily part of said subject, a dense medium optical element having a totally internally reflecting surface adapted to have a skin ridge pattern formed thereon by contact therewith of said subject's skin ridges from the side of an adjacent rare medium thereby causing frustration of total reflection at the points of said contact, means for illuminating said facial features and said skin ridge pattern, first optical means disposed between said totally internally reflecting surface and said recording means for side-reversing and adjusting the proportions of said skin ridge pattern image, and second optical means disposed between said first optical means and said recording means for adjusting the relative sizes of said facial and said skin ridge pattern images relative to each other.

References Cited by the Examiner

UNITED STATES PATENTS

2,195,699	4/40	Johnson	88—24
2,830,512	4/58	Nagel	95—1.1
3,058,021	10/62	Dunn	88—1 X
3,083,623	4/63	Mott	95—1.7

FOREIGN PATENTS

432,240	7/26	Germany.

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